

WHAT IS CLAIMED IS:

- 1 1. A disk array apparatus, comprising:
 - 2 a connector provided for connection with an external power supply to receive
 - 3 power from the external power supply;
 - 4 an internal power supply section for supplying the power received from the
 - 5 connector after AC/DC conversion;
 - 6 a plurality of disk drive cabinets, each connected to the internal power supply
 - 7 section, each including: a first voltage converter for subjecting the power coming from the
 - 8 internal power supply section to DC conversion to derive a different voltage; a disk drive for
 - 9 receiving the power as a result of conversion by the first voltage converter; and a first backup
 - 10 power supply for storing the power provided to the first voltage converter;
 - 11 a communications adapter connected to the internal power supply section for
 - 12 performing data exchange with an external device, including: a second voltage converter for
 - 13 subjecting the power coming from the internal power supply section to DC conversion to
 - 14 derive a different voltage; a plurality of power consumption circuits for receiving the power
 - 15 as a result of conversion by the second voltage converter; and a second backup power supply
 - 16 for storing the power provided to the second voltage converter;
 - 17 a disk adapter connected to the internal power supply section for controlling
 - 18 data writing or reading to/from the disk drive cabinets, including: a third voltage converter
 - 19 for subjecting the power coming from the internal power supply section to DC conversion to
 - 20 derive a different voltage; a plurality of power consumption circuits for receiving the power
 - 21 as a result of conversion by the third voltage converter; and a third backup power supply for
 - 22 storing the power provided to the third voltage converter;
 - 23 a memory section connected to the internal power supply section for storing
 - 24 data and control information to be written or read to/from the communications adapter and
 - 25 the disk adapter, including: a fourth voltage converter to subject the power coming from the
 - 26 internal power supply section to DC conversion to derive a different voltage; a plurality of
 - 27 power consumption circuits for receiving the power as a result of conversion by the fourth
 - 28 voltage converter; and a fourth backup power supply for storing the power provided to the
 - 29 fourth voltage converter; and
 - 30 a mutual power supply line that is connected to the disk drive cabinets, the
 - 31 communications adapter, the disk adapter, and to the memory section, so that when the power
 - 32 from the internal power supply section is interrupted, the mutual power supply line can

33 supply backup power to any of the components in need of power using the first backup power
34 supply provided to each of the disk drive cabinets, the second backup power supply provided
35 to the communications adapter, the third backup power supply provided to the disk adapter,
36 and the fourth backup power supply provided to the memory section.

1 2. The disk array apparatus according to claim 1, further comprising a
2 detachable member for an additional backup power supply.

1 3. The disk array apparatus according to claim 1, wherein in the detachable
2 member, a region for incorporating a backup power supply can be used for incorporating a
3 device to be incorporated into the disk drive cabinet, the communications adapter, the disk
4 adapter, and the memory section.

1 4. The disk array apparatus according to claim 1, wherein the first backup
2 power supply is detachable from the disk drive cabinet, the second backup power supply is
3 detachable from the communications adapter, the third backup power supply is detachable
4 from the disk adapter, and the fourth backup power supply is detachable from the memory
5 section.

1 5. The disk array apparatus according to claim 2, wherein power stored in the
2 additional backup power supply is supplied to any of the components in need thereof through
3 the mutual power supply line.

1 6. The disk array apparatus according to claim 1, wherein when the power
2 from the internal power supply section is interrupted, from the backup power supply
3 corresponding to any of the components that has been stopped in operation responding to
4 completion of a save process executed to save data that has been temporarily stored in the
5 memory section into a disk drive in the disk drive cabinet, the data stored therein is supplied
6 to any of the components in operation through the mutual power supply line.

1 7. The disk array apparatus according to claim 1, wherein the second and third
2 voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

1 8. The disk array apparatus according to claim 1, wherein an output voltage
2 from the internal power supply section is set low enough to be directly supplied through the

3 mutual power supply line to the second and third voltage converters, wherein the second and
4 third voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

1 9. The disk array apparatus according to claim 1, wherein the first and fourth
2 voltage converters each is a non-isolated DC/DC converter.

1 10. The disk array apparatus according to claim 1, wherein the first to fourth
2 backup power supplies each includes a charge/discharge circuit and a secondary battery.

1 11. A power backup method for a disk array apparatus, comprising:
2 a first step of receiving power from an external power supply through a
3 connector provided for connection therewith;
4 a second step of supplying the power received from the connector in the first
5 step after AC/DC conversion in an internal power supply section;

6 a third step of converting a direct current coming from the internal power
7 supply section as a result of AC/DC conversion in the second step into another direct current
8 having a different voltage by a first voltage converter each provided to a plurality of disk
9 drive cabinets that are connected to the internal power supply section;

10 a fourth step of supplying the power as a result of conversion by the first
11 voltage converter in the third step from the first voltage converter to a disk drive provided to
12 each of the disk drive cabinets;

13 a fifth step of supplying the power as a result of conversion by the first voltage
14 conversion in the third step from the first voltage converter to a first backup power supply for
15 storing the power to be supplied to the first voltage converter each provided to the disk drive
16 cabinets;

17 a sixth step of converting the direct current coming from the internal power
18 supply section in the second step into another direct current having a different voltage by the
19 second voltage converter of a communications adapter for data provision and reception with
20 an external device that is connected to the internal power supply section;

21 a seventh step of supplying the power as a result of conversion by the second
22 voltage converter in the sixth step from the second voltage converter to a plurality of power
23 consumption circuits of the communications adapter;

24 an eighth step of supplying the power as a result of conversion by the second
25 voltage converter in the sixth step from the second voltage converter to a second backup

26 power supply for storing the power to be supplied to the second voltage converter of the
27 communications adapter;

28 a ninth step of converting the direct current coming from the internal power
29 supply section in the second step into another direct current having a different voltage using a
30 third voltage converter of a disk adapter that controls data writing or reading to/from the disk
31 drive cabinets that are connected to the internal power supply section;

32 a tenth step of supplying the power as a result of conversion by the third
33 voltage converter in the ninth step from the third voltage converter to the power consumption
34 circuits of the disk adapter;

35 an eleventh step of supplying the power as a result of conversion by the third
36 voltage converter in the ninth step from the third voltage converter to a third backup power
37 supply for storing the power to be supplied to the third voltage converter of the disk adapter;

38 a twelfth step of converting the direct current coming from the internal power
39 supply section in the second step into another direct current having a different voltage using a
40 fourth voltage converter of a memory section for storing data and control information to be
41 written or read to/from the communications adapter and the disk adapter both connected to
42 the internal power supply section;

43 a thirteenth step of supplying the power as a result of conversion by the fourth
44 voltage converter in the twelfth step from the fourth voltage converter to the power
45 consumption circuits of the memory section;

46 a fourteenth step of supplying the power as a result of conversion by the fourth
47 voltage converter in the twelfth step from the fourth voltage converter to a fourth backup
48 power supply for storing the power to be supplied to the fourth voltage converter of the
49 memory section; and

50 a fifteenth step of, when the internal power supply section stops in current
51 supply in the second step, through a mutual power supply line that is connected to
52 components of the disk drive cabinets, the communications adapter, the disk adapter, and the
53 memory section, performing power provision to any of the components in need of power
54 using any of the corresponding backup power supplies.

1 12. The power backup method of the disk array apparatus according to claim
2 11, wherein the disk array apparatus further comprises a detachable member for an additional
3 backup power supply.

1 13. The power backup method of the disk array apparatus according to claim
2 11, wherein in the detachable member of the disk array apparatus, a region for incorporating
3 a backup power supply can be used for incorporating a device to be incorporated into the disk
4 drive cabinet, the communications adapter, the disk adapter, and the memory section.

1 14. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, the first backup power supply is detachable from the
3 disk drive cabinet, the second backup power supply is detachable from the communications
4 adapter, the third backup power supply is detachable from the disk adapter, and the fourth
5 backup power supply is detachable from the memory section.

1 15. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, power stored in the additional backup power supply
3 is supplied to any of the components in need thereof through the mutual power supply line.

1 16. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, when the power from the internal power supply
3 section is interrupted, from the backup power supply corresponding to any of the components
4 that has been stopped in operation responding to completion of a save process executed to
5 save data that has been temporarily stored in the memory section into a disk drive in the disk
6 drive cabinet, the data stored therein is supplied to any of the components in operation
7 through the mutual power supply line.

1 17. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, the second and third voltage converters each is a fast-
3 transient-response-type non-isolated DC/DC converter.

1 18. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, an output voltage from the internal power supply
3 section is set low enough to be directly supplied through the mutual power supply line to the
4 second and third voltage converters, wherein in the disk array apparatus, the second and third
5 voltage converters each is a fast-transient-response-type non-isolated DC/DC converter.

1 19. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, the first and fourth voltage converters are both a non-
3 isolated DC/DC converter.

1 20. The power backup method of the disk array apparatus according to claim
2 11, wherein in the disk array apparatus, the first to fourth backup power supplies each include
3 a charge/discharge circuit and a secondary battery.